Antimicrobial Stewardship Program

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Antibiotic Timeline

Antibiotic deployment

Sulfonamides → Penicillin → Chloramphenicol → Streptomycin → Tetracycline → Erythromycin → Vancomycin → Ampicillin → Cephalosporins → Methicillin

Antibiotic resistance observed

Clatworthy 2007
Antibiotic Use in Freestanding Children’s Hospitals

- 37 hospitals: 556,692 discharges in 2008
- Among the hospitals large variability
  - 38-72% receive an antibiotic
  - 368-601 days per 1000 patient days
- Positive correlation with percent receiving an antibiotic and days of therapy
  - All antibiotics
  - Broad spectrum antibiotics

Gerber J et al., Pediatrics 2010; 126:1067
Appropriateness of Antibiotics

- 50% of antimicrobial use is either unnecessary or inappropriate
  - 30% of anti-anaerobic agents inappropriate
  - 50% of vancomycin use in adult populations is inappropriate
- 35% of initial vancomycin courses inappropriate in a pediatric institution

Bolon MK et al. ICHE 2005
Gram Negative Resistance in Children

Carbapenem-Resistant Enterobacteraceae in Children

CDC Threat Report

- 23,000 Americans die annually from an antibiotic resistant infection
- 2 million Americans are infected annually with an antibiotic resistant infection
- 250,000 Americans suffer from *C. difficile* infection
  - 19,000 die from *C. difficile* infection

http://www.cdc.gov/drugresistance/threat-report-2013/
National Action Plan to Combat Antibiotic Resistant Bacteria

• Published March 2015

• Goal 1
  • All healthcare facilities will be required to have an antimicrobial stewardship program
  • Reduce inappropriate antimicrobial prescribing by 20% and outpatient by 50%
CDC 7 Core Elements for Antimicrobial Stewardship

• Leadership Commitment
• Accountability
• Drug Expertise
• Actions
• Tracking
• Reporting
• Education
Nationwide PICU Data

Overall Adjusted DOT / 1000 pt days

Mean Adjusted Overall Antibiotics DOT / 1000 pt days (919.8)
Mean Adjusted ICU Antibiotics DOT / 1000 pt days (1143.9)

Children's Hospitals (n=41)

- Overall Hospital Antibiotics
- ICU Antibiotics
<table>
<thead>
<tr>
<th>Generic Drug Code - Title</th>
<th>Hosp Total Patient Days</th>
<th>Peer Total Patient Days</th>
<th>Hosp Cases Rec’d Antibiotics</th>
<th>Peer Cases Rec’d Antibiotics</th>
<th>Hosp Days Rec’d Antibiotics</th>
<th>Peer Days Rec’d Antibiotics</th>
<th>Hosp DOT/1,000 pt days</th>
<th>Peer DOT/1,000 pt days</th>
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</thead>
<tbody>
<tr>
<td>124133 - Vancomycin</td>
<td>428</td>
<td>15,315</td>
<td>2,350</td>
<td>79,618</td>
<td>169.10</td>
<td>112.95</td>
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<tr>
<td>122252 - Cefepime HCl</td>
<td>260</td>
<td>5,049</td>
<td>1,763</td>
<td>38,058</td>
<td>126.86</td>
<td>54.38</td>
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<tr>
<td>124451 - Sulfamethoxazole/trimeth</td>
<td>134</td>
<td>4,651</td>
<td>1,074</td>
<td>35,039</td>
<td>77.28</td>
<td>49.71</td>
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<tr>
<td>122109 - Cefazolin sodium</td>
<td>284</td>
<td>14,174</td>
<td>1,038</td>
<td>39,828</td>
<td>74.69</td>
<td>56.50</td>
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<td>124118 - Meropenem</td>
<td>94</td>
<td>2,423</td>
<td>947</td>
<td>24,996</td>
<td>68.14</td>
<td>35.63</td>
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<tr>
<td>121265 - Piperacillin/tazobactam</td>
<td>105</td>
<td>5,580</td>
<td>701</td>
<td>37,625</td>
<td>50.44</td>
<td>53.38</td>
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<td>122231 - Ceftriaxone sodium</td>
<td>172</td>
<td>13,750</td>
<td>476</td>
<td>51,696</td>
<td>34.25</td>
<td>73.34</td>
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<td>121231 - Ampicillin sod/sulbactam</td>
<td>97</td>
<td>2,402</td>
<td>450</td>
<td>9,959</td>
<td>32.38</td>
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<td>122211 - Cefotaxime sodium</td>
<td>96</td>
<td>3,297</td>
<td>401</td>
<td>15,232</td>
<td>28.86</td>
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<td>123201 - Ciprofloxacin</td>
<td>41</td>
<td>1,797</td>
<td>359</td>
<td>12,383</td>
<td>25.83</td>
<td>17.57</td>
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<td>124143 - Clindamycin</td>
<td>70</td>
<td>6,705</td>
<td>323</td>
<td>30,748</td>
<td>23.24</td>
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<tr>
<td>121225 - Ampicillin</td>
<td>61</td>
<td>4,300</td>
<td>309</td>
<td>18,379</td>
<td>22.24</td>
<td>26.07</td>
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<td>121217 - Amoxicillin trihydrate</td>
<td>83</td>
<td>2,895</td>
<td>270</td>
<td>13,797</td>
<td>19.43</td>
<td>19.67</td>
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</tbody>
</table>
St. Louis Children’s ASP

Mission/Goal

• To provide the best antimicrobial therapy (right dose, drug and duration) to patients that results in the best outcome with the least amount of toxicity and resistance.

Philosophy

• Communication and Collaboration
St. Louis Children’s ASP

Core Team

• Pharmacist- Miranda Nelson
• ID physician- Jason Newland
• Clinical pharmacists
• Data analyst- Angela Niesen
• Infection prevention & Control- Ericka Hays
• Microbiology- Greg Storch, Carey-Ann Burnham
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ASP strategies

• Prior-approval/restriction
• Prospective-audit with feedback
• Empiric antibiotic selection guideline
  • Embedded in order sets
• Clinical practice guideline(s)
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ASP strategies

• Prior-approval/restriction
  • Ceftaroline, daptomycin, IV doxycycline, posaconazole, tigecycline, linezolid
  • ID consult required for antibiotic lock therapy, ceftolozane/tazobactam, ceftazidime/avibactam
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ASP strategies

• Prospective-audit with feedback
  • Tentatively will start mid August reviewing all antibiotics daily
  • Stewardship rounds

• Want to be available for any questions or feedback on the program
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ASP strategies

• Empiric antibiotic selection guideline for common infections

• Has been reviewed by PICU CLG - edits and additions have been added
Questions